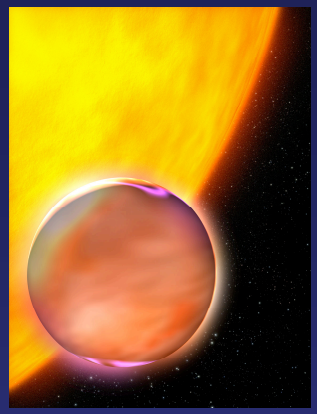


Exoplanet Forum - May 29 & 30, 2008

"Transits"

Drake Deming (topical area lead)

presenters

Latham, Swain, Beichman & Herrington

Outline:

- Latham (15) - transits, setting the stage
- Swain (20) - recent highlights and what we can do today
- Harrington (20) - next steps for characterization
- Chas - next steps for finding and JWST
- (ALL) - Mission Concepts - “5 minutes of fame”
- Chas - What we need to support:

Exoplanet science:

an exceptional period

- Transition period
- “break through” or “transformational” science
- changing the way we think about exoplanets

2005
Does it exist?
Temperature?
Is it a rock?

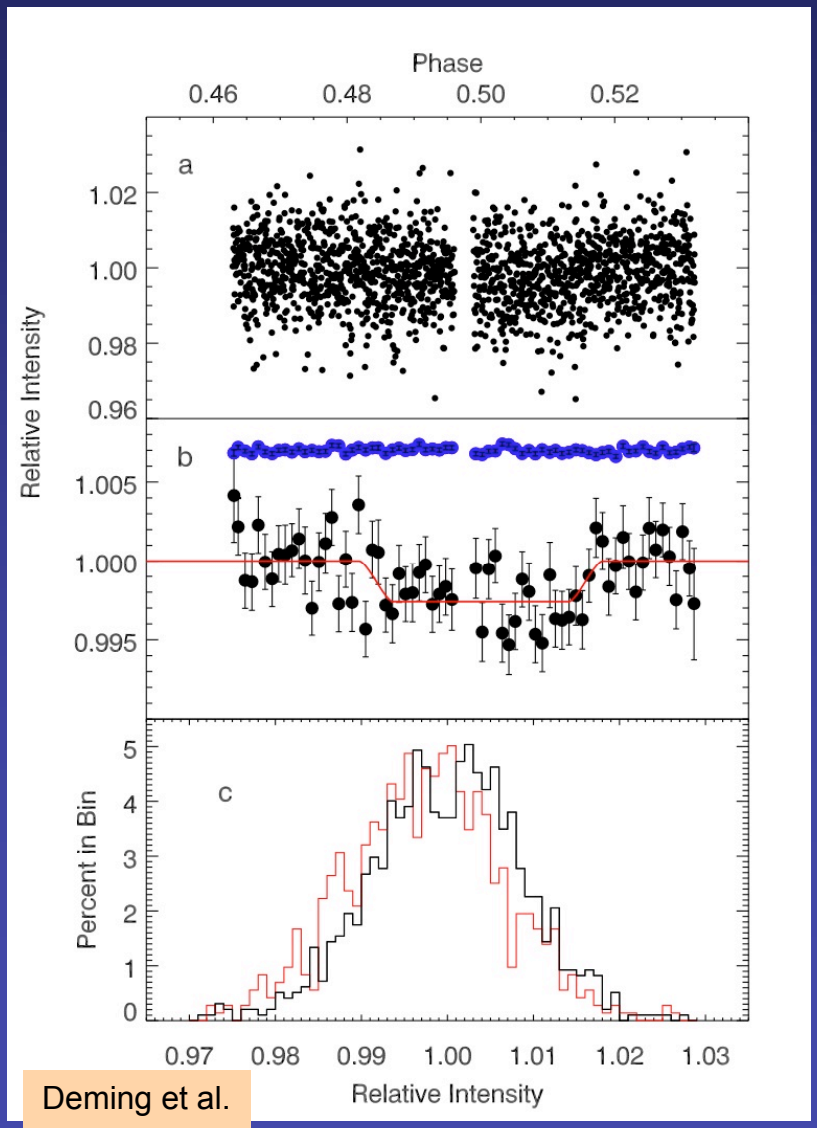
Artist's View of Extrasolar Planet HD 189733b
NASA, ESA, and G. Bacon (STScI) • STScI-PRC08-11

2008
Weather forecast
What causes smog
Prebiotic molecules

Temperature measured

2005: first emission detected

- Requires working in infrared
- Small signal = difficult!
- T = 1500 K

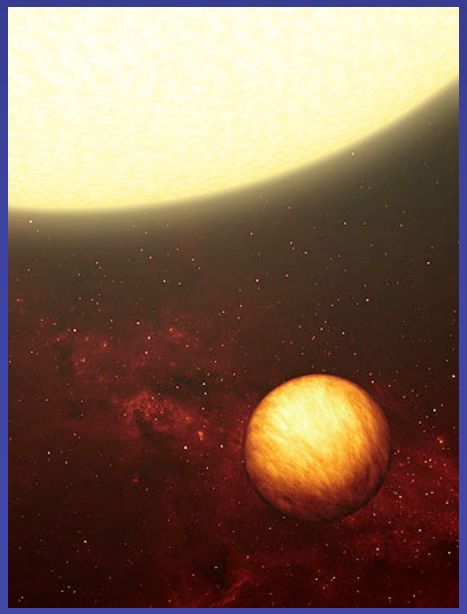


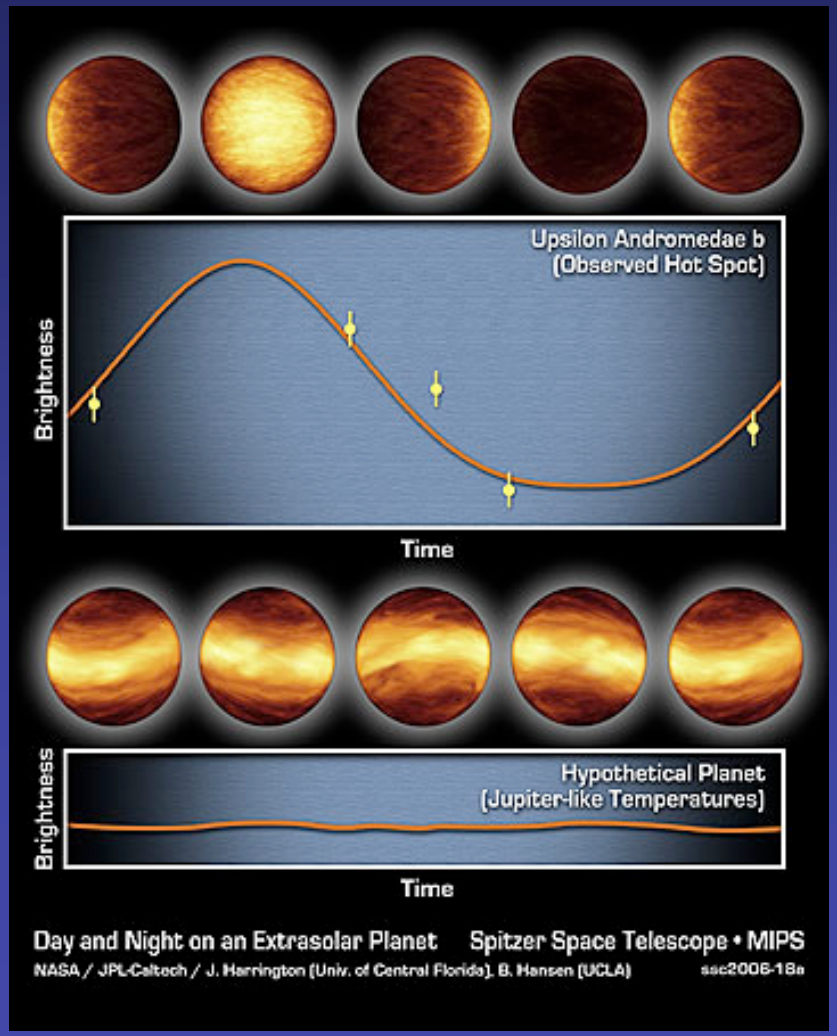
Deming et al.

Upsilon Andromedea

2006: non-transiting light curve

- Large day/night temperature difference
- A milestone

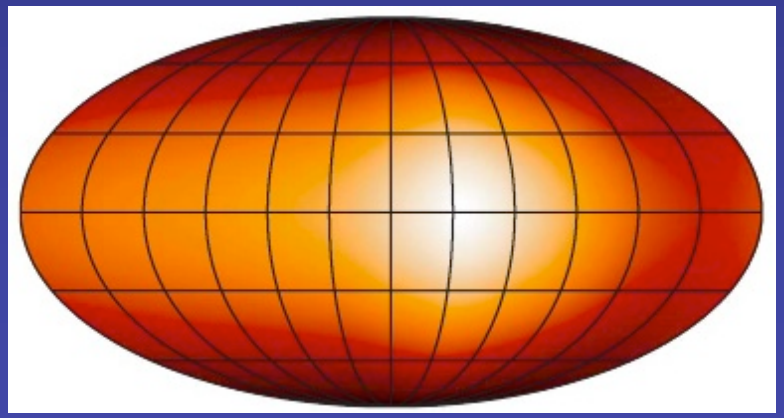


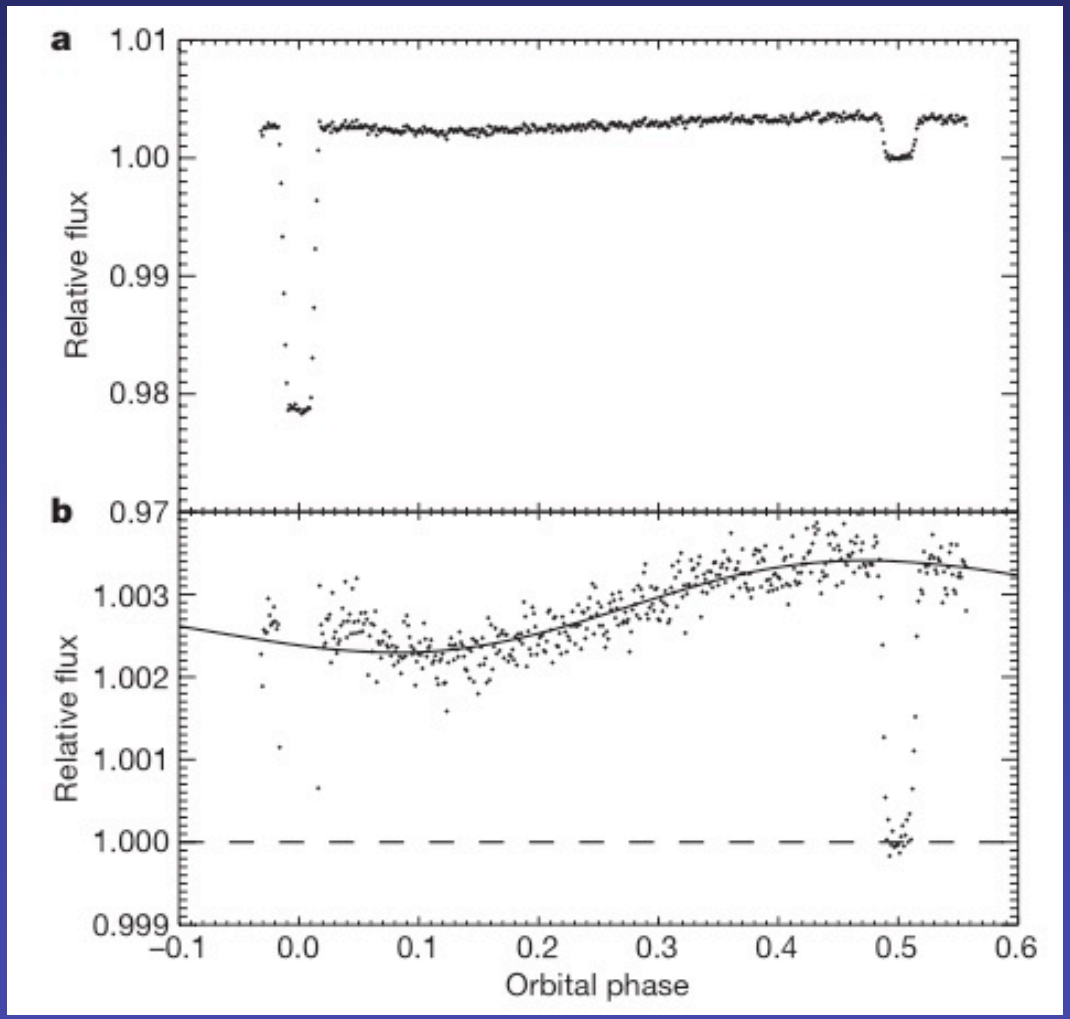


Harrington et al.

Day and night detected on 189
2007:

- Redistribution of heat
- Day and night temperatures

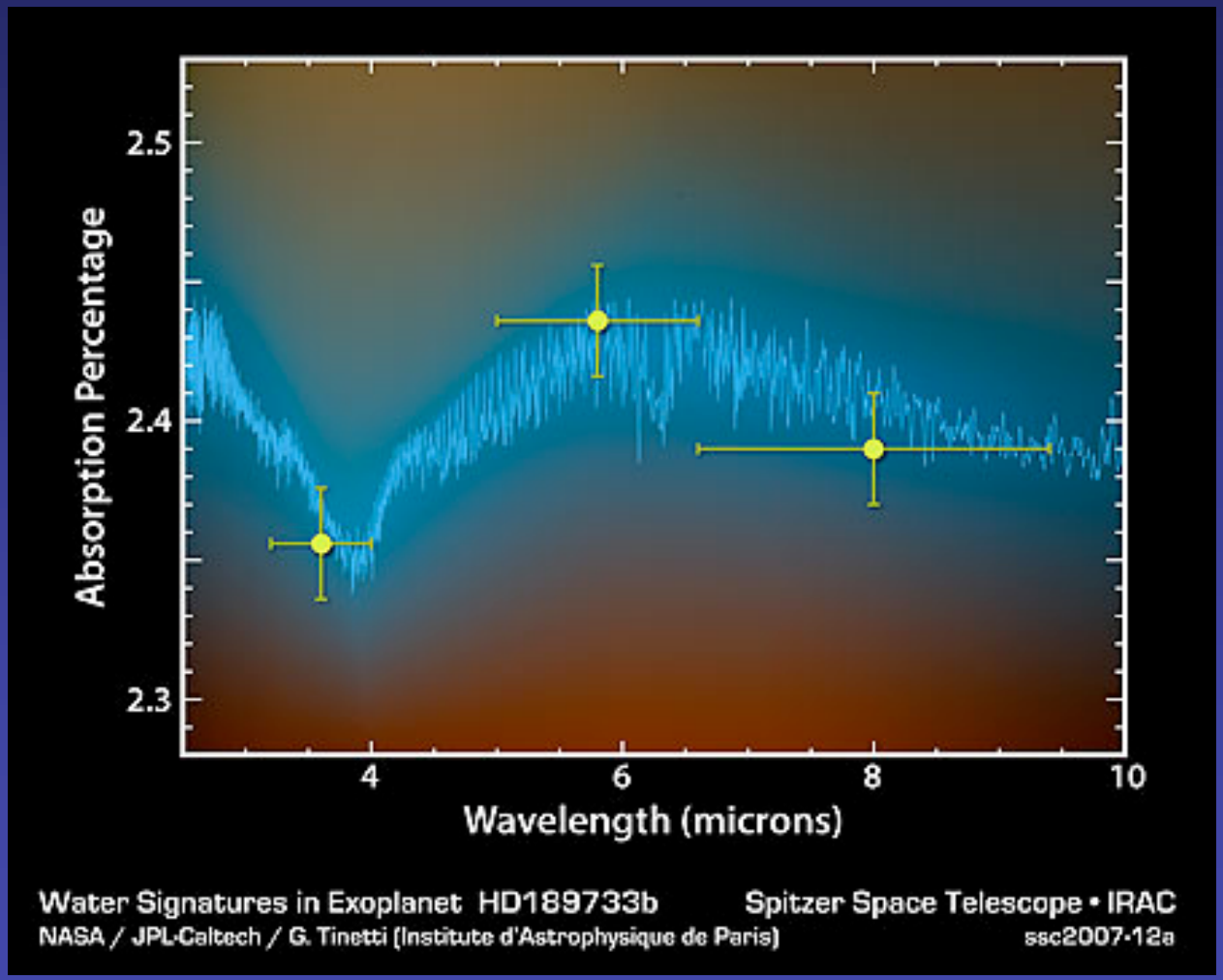




Knutson et al.

Water detected on 189733b

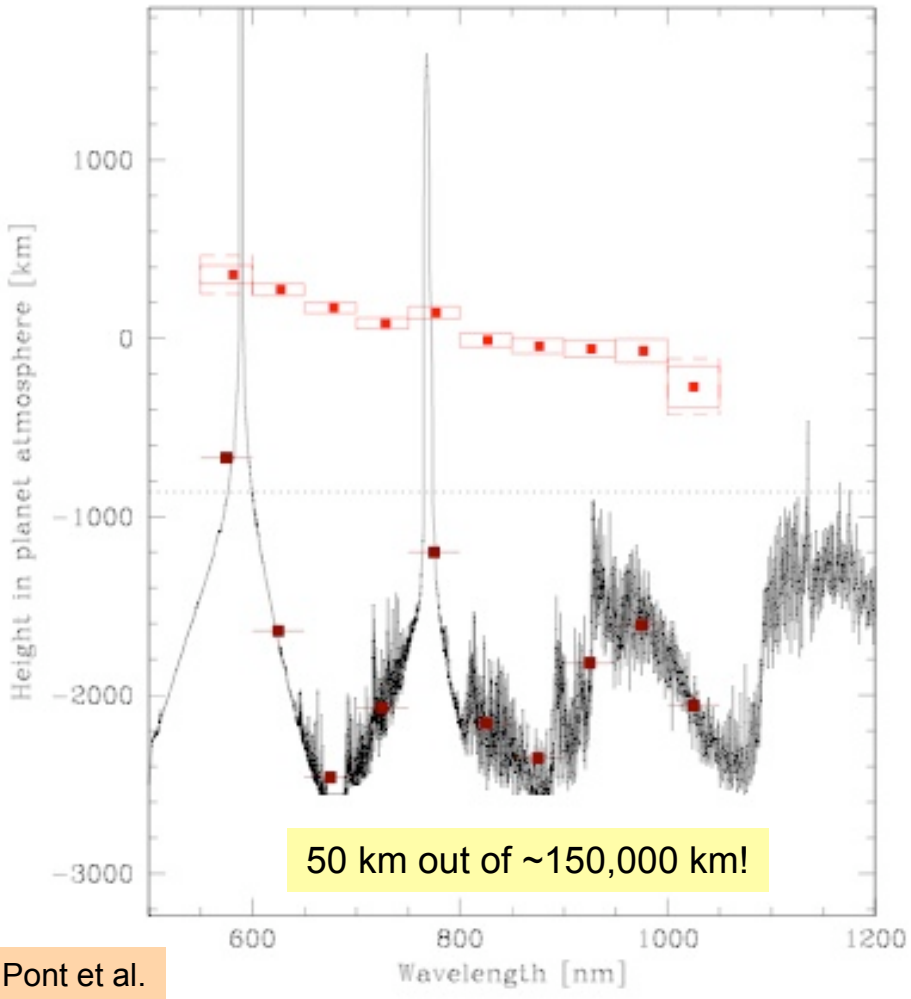
2007



Haze on 189

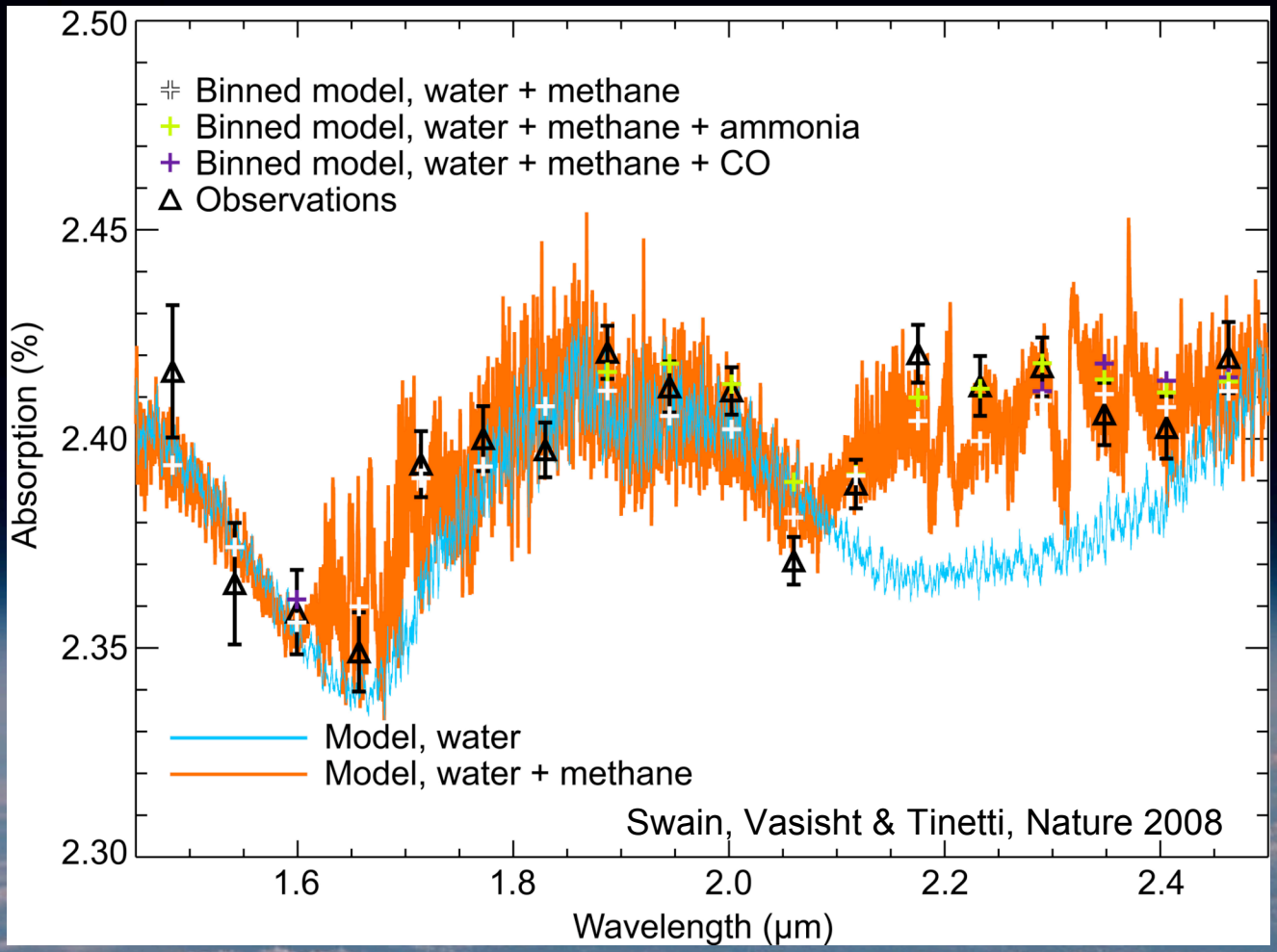
2007

- Visible transmission spectrum
- Small particles at high altitude
- Would Al Gore care?



Pont et al.

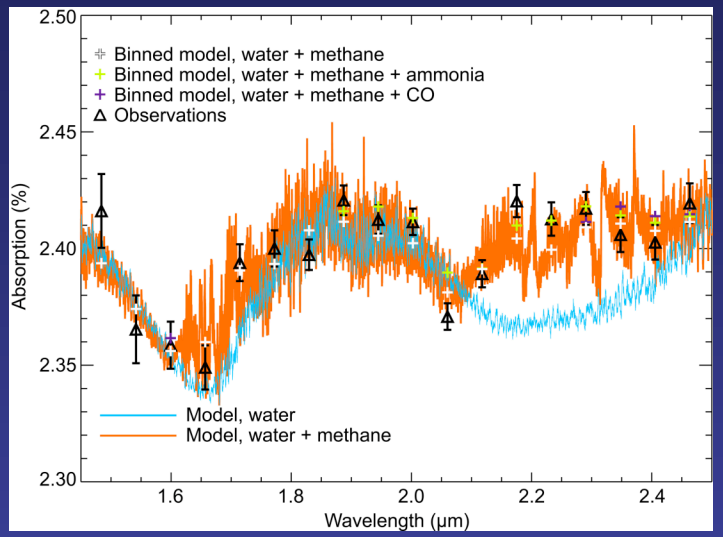
Methane detected in an exoplanet atmosphere

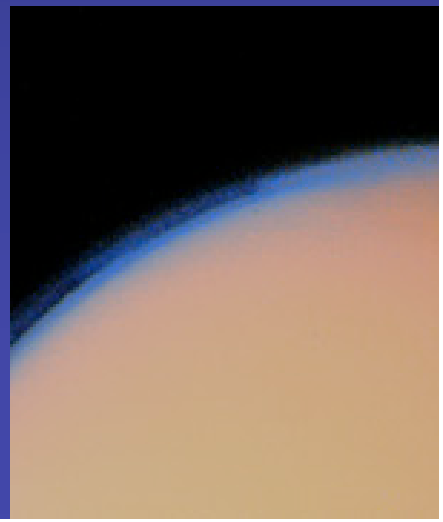


Hubble measurement implications:

enter the molecules

- Hubble can characterize numerous exoplanets.
- Water, methane, carbon monoxide, carbon dioxide and ammonia can be measured.
- Small telescopes useful; SNR ~ D.
- Given the appropriate target, we could measure organic molecules on a habitable zone exoplanet today.
- GJ 436b is “almost there” (Neptune mass, 700 K, hydrogen rich)





Five Myths:

exoplanet spectroscopic characterization requirements

- Transits
- Bright targets
- Large telescope
- New instrument technology
- Exceedingly difficult